Docket No.: KAK-004
(PATENT)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of:
Hiroaki Kitano et al.

Application No.: 10/018,571

Confirmation No.: 5012

Filed: April 25, 2002

Art Unit: 2129

For: METHOD AND DEVICE FOR NETWORK INFERENCE

Examiner: O. F. Fernandez Rivas

APPELLANT'S BRIEF

MS Appeal Brief - Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

This is an Appeal Brief under 37 C.F.R. §41.37 appealing the final decision of the Examiner dated March 8, 2007. Each of the topics required by 37 C.F.R. §41.37 is presented herewith and is labeled appropriately. This Brief is in furtherance of the Final Office Action on March 8, 2007.

In response to the previous Final Office Action mailed November 2, 2006, a Notice of Appeal was filed in this case on December 22, 2006, along with a Request for Panel Review and a *one-month* extension.

The Notice of Panel Decision From Pre-Appeal Brief Review mailed on January 24, 2007 ("the Decision) indicates that the Final Office Action of November 2, 2006 is withdrawn and a new Office Action will be mailed.

A Notice of Appeal has been filed in this case concurrent with the Appeal Brief.

Accordingly, the filing of the Appellant's Brief is timely.

I. REAL PARTY IN INTEREST

Japan Science and Technology Corporation is the real parties in interest of the present application. An assignment of all rights in the present application to Japan Science and Technology Corporation was executed by the inventor and recorded by the U.S. Patent and Trademark Office at **reel 012990, frame 0578.**

II. RELATED APPEALS AND INTERFERENCES

There are no other appeals or interferences which will directly affect or be directly affected by or have a bearing on the Board's decision in this appeal.

III. STATUS OF CLAIMS

Within the Final Office Action of January 24, 2007:

Paragraph 6 of the Office Action indicates a rejection of claims 30 and 36 under 35 U.S.C. §112.

Paragraph 8 of the Office Action indicates a rejection of claims 18-39 under 35 U.S.C. §101.

Paragraph 11 of the Office Action includes a rejection of claims 18-23 and 25-39 under 35 U.S.C. §102 as allegedly being anticipated by U.S. Patent No. 5,148,513 to Koza et al. (Koza).

Paragraph 14 of the Office Action includes a rejection of claims 24-25 under 35 U.S.C. §103 as allegedly being unpatentable over Koza in view of U.S. Patent No. 5,761,381 to Arci et al. (Arci).

Thus, the status of the claims is as follows:

1-17: (Canceled)

Claims 18-39: (Rejected)

No claims are indicated within the Final Office Action to contain allowable subject matter.

Accordingly, Appellant hereby appeals the final rejection of claims 18-39, which are presented in the Claims Appendix.

IV. STATUS OF AMENDMENTS

Subsequent to the final rejection of January 24, 2007, an Amendment After Final Action Under 37 C.F.R. 1.116 has been filed in this case concurrent with the Appeal Brief.

V. SUMMARY OF CLAIMED SUBJECT MATTER

The following description is provided for illustrative purposes and is not intended to limit the scope of the invention.

<u>Claim 18</u> is drawn to a method of operating a data processing system, the method comprising the steps of:

> providing an expression profile of a network, said network represented by triplets having a network structure, parameters, and a degree of fitness (Substitute specification at paragraph [0052]);

generating network structures allowing said expression profile, said generated network structures being stored in a topology pool (Substitute specification at paragraph [0053]);

selecting network structures from said topology pool, adapting said parameters to said selected network structures, and computing said degrees of fitness (Substitute specification at paragraph [0061]);

storing said networks represented by triplets resulting from steps above in a triplet pool (Substitute specification at paragraph [0061]); and

screening candidate networks from said triplet pool, said screened candidate networks being stored in a candidate triplet pool (Substitute specification at paragraph [0062]).

Claim 27 is drawn to a computer program embodied on a computer readable medium comprising:

code means adapted to perform all the steps of claim 18 when said program is run on a data-processing system (Substitute specification at paragraph [0119]).

Claim 28 is drawn to a network estimation apparatus comprising:

means for providing an expression profile of a network, said network represented by triplets having a network structure, parameters, and a degree of fitness (Substitute specification at paragraph [0052]);

means for generating network structures allowing said expression profile, said generated network structures being stored in a topology pool (Substitute specification at paragraph [0053]);

means for selecting network structures from said topology pool, adapting said parameters to said selected network structures, and computing said degrees of fitness (Substitute specification at paragraph [0061]);

means for storing said networks represented by triplets resulting from means above in a triplet pool (Substitute specification at paragraph [0061]); and

means for screening candidate networks from said triplet pool, said screened candidate networks being stored in a candidate triplet pool (Substitute specification at paragraph [0062]).

Claim 29 is drawn to a method of operating a data processing system which estimates candidate networks that are descriptive of relationships between interrelated elements as a network and that, when data generated by said elements from said network is given, are capable of reproducing data based on said data given:

said network being represented by a triplet comprising:

a network structure (Substitute specification at paragraph [0051]),

a parameter set (Substitute specification at paragraph [0052]), and

a degree of fitness between said data given and data reproduced from the network structure and the parameter set (Substitute specification at paragraph [0052]),

said method comprising the steps of:

generating a plurality of candidate networks by producing network structures based on partially known network structures, which may allow for reproduction of said data given (Substitute specification at paragraph [0055]),

producing corresponding parameter sets and degrees of fitness (Substitute specification at paragraph [0060]),

optimizing said networks utilizing the degrees of fitness (Substitute specification at paragraph [0061], [0088]), and

storing the optimized candidate networks in a first memory means (Substitute specification at paragraph [0061]); and

narrowing down appropriate candidate networks from said networks stored in the first memory means, using data different front said given data and that can be generated from network structures which are mutants or crossovers, and storing the networks in a second memory means (Substitute specification at paragraph [0062]).

Claim 30 is drawn to the method mentioned in claim 29, wherein the optimization using the degree of fitness in said step of generating said plurality of candidate networks comprises steps of:

selecting N network structures from the produced network structures (Substitute specification at paragraph [0071]),

producing N network structures from said selected N network structures (Substitute specification at paragraph [0071]),

adapting M parameter sets to each of the 2N networks utilizing degree of fitness to generate the networks (Substitute specification at paragraph [0071]), and

selecting P networks of high degree of fitness from the generated $2N \times M$ networks (Substitute specification at paragraph [0071]).

Claim 34 is drawn to a network estimation apparatus, which estimates candidate networks that are descriptive of relationships between inter related elements as a network and that, when data generated from said network is given, are capable of reproducing said data based on said data given; said network estimation apparatus comprising:

first memory means for storing networks represented by a triplet comprising a network structure, a parameter set, and a degree of fitness between said data given and data reproduced. from the network structure and the parameter set (Substitute specification at paragraph [0062]);

second memory means for storing networks as final candidates (Substitute specification at paragraph [0062]);

> means for generating a plurality of candidate networks by producing a network structure based on partially known network structures, which may allow for reproduction of said data given, producing corresponding parameter sets and degrees of fitness, optimizing said networks utilizing the degrees of fitness, and storing in said first memory means the optimized candidate networks (Substitute specification at paragraph [0062], [0073]); and
>
> means for narrowing down and storing in said second memory means an appropriate candidate network from net works stored in said first memory means using data different from said given data and that can be generated from network structures which are mutants or crossovers (Substitute specification at paragraph [0062], [0077]).

Claim 35 is drawn to a computer program embodied on a computer readable medium, the computer program being adapted to perform steps of:

> generating a plurality of candidate networks by producing network structures based on partially known network structures, which may allow for reproduction of said data given (Substitute specification at paragraph [0064]),
>
> producing corresponding parameter sets and degrees of fitness (Substitute specification at paragraph [0066]),
>
> optimizing said networks utilizing the degrees of fitness (Substitute specification at paragraph [0088]), and
>
> storing the optimized candidate networks in a first memory means (Substitute specification at paragraph [0097]); and
>
> narrowing down appropriate candidate networks from said networks stored in the first memory means, using data different front said given data and that can be generated from network structures which are mutants or crossovers, and storing the networks in a second memory means (Substitute specification at paragraph [0062], [0077]).

Claim 36 is drawn to the computer program mentioned in claim 35, wherein the optimization using the degree of fitness in said step of generating said plurality of candidate networks comprises steps of:

selecting N network structures from the produced network structures (Substitute specification at paragraph [0072]),

producing N network structures from said selected N network structures (Substitute specification at paragraph [0072]),

adapting M parameter sets to each of the 2N networks utilizing degree of fitness to generate the networks (Substitute specification at paragraph [0072]), and

selecting P networks of high degree of fitness from the generated 2N × M networks (Substitute specification at paragraph [0072]).

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

The issues presented for consideration in this appeal are as follows:

Whether the Examiner erred in rejecting claims 30 and 36 under 35 U.S.C. §112.

Whether the Examiner erred in rejecting claims 18-39 under 35 U.S.C. §101.

Whether the Examiner erred in rejecting claims 18-23 and 25-39 under 35 U.S.C. §102 as allegedly being anticipated by U.S. Patent No. 5,148,513 to Koza et al. (Koza).

Whether the Examiner erred in rejecting claims 24-25 under 35 U.S.C. §103 as allegedly being unpatentable over Koza in view of U.S. Patent No. 5,761,381 to Arci et al. (Arci).

These issues will be discussed hereinbelow.

VII. ARGUMENT

In the Office Action of January 24, 2007:

The Examiner erred in rejecting claims 30 and 36 under 35 U.S.C. §112.

The Examiner erred in rejecting claims 18-39 under 35 U.S.C. §101.

The Examiner erred in rejecting claims 18-23 and 25-39 under 35 U.S.C. §102 as allegedly being anticipated by U.S. Patent No. 5,148,513 to Koza et al. (Koza).

The Examiner erred in rejecting claims 24-25 under 35 U.S.C. §103 as allegedly being unpatentable over Koza in view of U.S. Patent No. 5,761,381 to Arci et al. (Arci).

For at least the following reasons, Appellant submits that this rejection is both technically and legally unsound and should therefore be reversed.

For purposes of this appeal brief only, and without conceding the teachings of any prior art reference, the claims have been grouped as indicated below.

The Examiner erred in rejecting claims 30 and 36 under 35 U.S.C. §112.

This rejection is traversed at least for the following reasons.

Pursuant to 37 C.F.R. § 41.37(c)(2):

> A brief shall not include any new or non-admitted amendment, or any new or non-admitted affidavit or other evidence. See § 1.116 of this title for amendments, affidavits or other evidence filed after final action but *before or on the same date of filing an appeal* and § 41.33 for amendments, affidavits or other evidence filed after the date of filing the appeal.

After a final rejection or other final action in an application or in an ex parte reexamination, or an action closing prosecution in an inter partes reexamination, but *before or on the same date of filing an appeal*, an amendment presenting rejected claims in better form for consideration on appeal *may be admitted*. 37 C.F.R. §1.116 (b)(2).

In this regard, it is believed that the Amendment After Final Action (37 CFR Section 1.116) filed along with the present Appellants' Brief presents the rejected claims in better form for consideration on appeal.

The Examiner erred in rejecting claims 18-39 under 35 U.S.C. §101.

This rejection is traversed at least for the following reasons.

Claim 18 - The Final Office Action contends that claims 18-28 fail to produce a useful, concrete, tangible result (Final Office Action at page 3).

Useful result

However, the Final Office Action has failed provide objective evidence showing that one of ordinary skill in the art would reasonably doubt the asserted utility at least for the following reasons.

An invention is "useful" under section 101 if it is capable of providing some identifiable benefit. *Juicy Whip Inc. v. Orange Bang Inc.,* 51 USPQ2d 1700, 1702 (Fed. Cir. 1999).

In this regard, independent claim 18 is drawn to a *method of operating a data processing system*. See *State Street Bank & Trust Co. v. Signature Financial Group Inc.*, 149 F.3d 1368, 47 USPQ2d 1596 (Fed. Cir. 1998). Also see, *Examination Guidelines for Computer-Related Inventions*, Official Gazette of the United States Patent and Trademark Office, Vol. 1300, No. 4, November 22, 2005 (The *Examination Guidelines*).

Moreover, *__the PTO has the initial burden__* of challenging a patent applicant's presumptively correct assertion of utility. *In re Swartz*, 56 USPQ2d 1703, 1704 (Fed. Cir. 2000).

If the PTO provides evidence showing that one of ordinary skill in the art would reasonably doubt the asserted utility, however, the burden shifts to the applicant to submit evidence sufficient to convince such a person of the invention's asserted utility. *In re Swartz*, 56 USPQ2d 1703, 1704 (Fed. Cir. 2000).

Nevertheless, the Office Action *__fails__* to explain with particularly and clarity as to why method of operating a data processing system fails "to produce a real-world result" and is found to be nonstatutory subject matter, especially when claim 18 include the steps of:

providing an expression profile of a network,

generating network structures allowing said expression profile,

selecting network structures from said topology pool, adapting said parameters to said selected network structures, and computing said degrees of fitness,

storing said networks represented by triplets resulting from steps above in a triplet pool,

screening candidate networks from said triplet pool.

In addition, this invention is capable of providing some identifiable benefit. For example, paragraph [0011] of the substitute specification notes that the present invention may efficiently narrow down hypothetically found models using a computer. Paragraph [0027] of the substitute specification highlights that, in the end, a comparatively small number of optimized candidate networks can be efficiently obtained.

Yet, the Final Office Action has ***__failed__*** to show an absence of some identifiable benefit while maintaining a rejection of the claims.

Moreover, it has been held that claimed steps of "converting", "applying", "determining", and "comparing" *are physical process steps that transform one physical, electrical signal into another*. *Arrhythmia Research Technology Inc. v. Corazonix Corp.*, 22 USPQ2d 1033, 1038 (Fed. Cir. 1992).

Yet, the Final Office Action has ***failed to provide any objective evidence*** showing that one of ordinary skill in the art would reasonably doubt the asserted utility found within claim 18.

Instead, ***only personal conclusory statements*** are set forth within the Final Office Action as reasoning for maintaining a rejection of the claims.

Tangible result

Without providing any supporting evidence, the Final Office Action concludes *a computer that solely calculates a mathematical formula is not statutory* (Final Office Action at page 4).

In response to this conclusion, independent claim 18 is drawn to *a method of operating a data processing system*. In this regard, the Final Office Action *fails* to show that independent claim 18 is drawn to *a computer*. Thus, an assertion as to claim 18 that *a computer that solely calculates a mathematical formula is not statutory* appears to be somewhat misplaced.

Moreover, the use of mathematical formulae or relationships to describe the electronic structure and operation of an apparatus ***does not*** make it nonstatutory. *Arrhythmia Research Technology Inc. v. Corazonix Corp.*, 22 USPQ2d 1033, 1039 (Fed. Cir. 1992).

As noted hereinabove, this invention is capable of providing some identifiable benefit. For example, paragraph [0011] of the substitute specification notes that the present invention may efficiently narrow down hypothetically found models using a computer. Paragraph [0027] of the substitute specification highlights that, in the end, a comparatively small number of optimized candidate networks can be efficiently obtained.

Moreover, the Final Office Action merely contends that *the result produced by the invention is maintained inside the computer (not outputted), which is considered to be a manipulation of abstract ideas (not tangible)* (Final Office Action at page 4).

In response to this contention, the Final Office Action fails to show within the specification for the present invention that *the result produced by the invention is maintained inside the computer (not outputted).* As a result, this contention found within the Final Office Action is conclusory at best.

<u>Concrete result</u>

The Final Office Action has failed to provide any reasoning as to why the claimed method could lead to an unpredictable result.

Thus, the Final Office Action ***<u>failed</u>*** to meet its initial burden of establishing an *<u>absence</u>* of a concrete result in the claimed invention.

Furthermore, since the Federal Circuit has held that *<u>a process claim</u>* that applies a mathematical algorithm to "produce a useful, concrete, tangible result without pre-empting other uses of the mathematical principle, on its face comfortably *<u>falls **within** the scope of §101</u>*," *AT&T Corp. v. Excel Communications, Inc.,* 172 F.3d 1352, 1358, 50 USPQ2d 1447, 1452 (Fed. Cir. 1999), one would think there would be no more issues to be resolved under 35 U.S.C. §101. *Ex parte Lundgren*, 76 USPQ2d 1385 (Bd. Pat. App. & Int. 2005).

<u>Claim 27</u> - The Final Office Action merely asserts that claims 27-39 describe subject matter similar to those of claims 18-26 and are rejected on the same basis (Final Office Action at page 4).

In response to this assertion, claim 27 is drawn to *<u>a computer program</u>* embodied on a computer readable medium comprising:

> code means adapted to perform all the steps of claim 18 when said program is run on a data-processing system.

Yet, the Final Office Action has failed to show that the *method* of claim 18 and the *computer program* of claim 27 are to be found within the same statutory class for the purposes of 35 U.S.C. §101.

Please note that as a rule, *computer programs* embodied in a tangible medium, such as floppy diskettes, ***are patentable subject matter*** under 35 U.S.C. Section 101 and ***must*** be examined under 35 U.S.C. Sections 102 and 103. *In re Beauregard*, 53 F.3d 1583, 35 USPQ2d 1383 (Fed. Cir. 1995). Independent claim 27 is drawn to *a computer program embodied on a computer readable medium*.

However, the Final Office Action *fails* to explain with particularly and clarity as to why a computer program embodied on a computer readable medium found to be nonstatutory subject matter.

Claim 28 - The Final Office Action merely asserts that claims 27-39 describe subject matter similar to those of claims 18-26 and are rejected on the same basis (Final Office Action at page 4).

In response to this assertion, claim 28 is drawn to a network estimation apparatus comprising:

> means for providing an expression profile of a network, said network represented by triplets having a network structure, parameters, and a degree of fitness;
>
> means for generating network structures allowing said expression profile, said generated network structures being stored in a topology pool;
>
> means for selecting network structures from said topology pool, adapting said parameters to said selected network structures, and computing said degrees of fitness;
>
> means for storing said networks represented by triplets resulting from means above in a triplet pool; and

means for screening candidate networks from said triplet pool, said screened candidate networks being stored in a candidate triplet pool.

Independent claim 28 is drawn to a <u>*network estimation apparatus*</u>. However, the Office Action fails to explain with particularly and clarity as to why a network estimation apparatus is found to be nonstatutory subject matter. See *Ex parte Logan*, 20 USPQ2d 1465 (Bd. Pat. App. & Inter. 1991).

These claims, under the broadest reasonable interpretation, could require the use of a computer. Accordingly, these claims recite statutory subject matter. *In re Comiskey*, 499 F.3d 1365, 84 USPQ2d 1670, 1680 (Fed. Cir. 2007).

<u>The Examiner erred in rejecting claims 18-23 and 25-39 under 35 U.S.C. §102 as allegedly being anticipated by U.S. Patent No. 5,148,513 to Koza et al. (Koza); and</u>

<u>The Examiner erred in rejecting claims 24-25 under 35 U.S.C. §103 as allegedly being unpatentable over Koza in view of U.S. Patent No. 5,761,381 to Arci et al. (Arci).</u>

These rejections are traversed at least for the following reasons.

Figure 4 of the specification as originally filed teaches the presence of a topology pool 300, a triplet pool 400, and a candidate pool 500.

An Examiner's Note within the Office Action refers to page 4, lines 15-17, of the Applicant's specification for the meaning of the term "a network" (Office Action at page 6).

In response, page 4, lines 15-17, of the Applicant's specification relied upon by the Office Action is <u>*not*</u> admitted prior art. Instead, this passage is found within the SUMMARY OF THE INVENTION portion of the specification as originally filed. Thus, the Office Action has impermissibly engaged in <u>***hindsight***</u> reconstruction by using the <u>*Applicant's disclosure as a template*</u> to fill the gaps within the teachings of Koza.

Koza - Regarding Koza, Figures 3A and 3B are flow charts of the processes for the invention of Koza.

Page 13 of the Final Office Action contends that Koza teaches the presence of a ***topology pool*** in the form of an initial population at step the *step Create Initial Populations 1321* which creates (typically randomly) a number of populations containing a number of programs (Koza at column 23, lines 33-35).

The Final Office Action contends that Koza develops an evolving population (***triplet pool***) at column 13, lines 37-54; column 23, lines 30-52 and Figures 3A and 3B) (Final Office Action at page 13).

However, a review of Koza reveals that this reference arguably teaches that process 1300 starts by the step Create Initial Populations 1321 which creates (typically randomly) a number of populations containing a number of programs (Koza at column 23, lines 33-35).

Moreover, Koza arguably teaches that in steps 1302-1305, a population is *designated as an evolving population*, and the remaining populations are designated as environmental populations (Koza at column 23, lines 35-52).

Koza arguably teaches that a step, Assign Values relative to environmental populations and Associate Values with each Entity 1312, involves *assigning a value (fitness) to each result produced by execution, and associating the value with the producing entity* (Koza at column 23, lines 55-60).

Koza arguably teaches that, after assigning and associating, Remove Entity(s) with relatively low fitness, step 1314 causes the removal of some of the less fit members of the evolving population (Koza at column 23, lines 60-64).

Koza arguably teaches that step 1316, Select Entity with relatively high fitness values, picks at least one entity to use in the following operation (Koza at column 23, line 67 to 24, line 2).

Koza arguably teaches that the newly created entities are inserted *into the evolving population* at 1370 and the process returns to the termination test 1303 (Koza at column 24, line 67 to 24, line 2).

Note that claim 18 provides for the step of selecting network structures from said topology pool, *adapting said parameters to said selected network structures, and computing said degrees of fitness*.

Yet, claim 18 additionally provides a step of *storing said selected network structures represented by triplets resulting from steps above* ***in a triplet pool***.

Additionally, Koza arguably teaches that in steps 1302-1305, a population is *designated as an evolving population*, and the remaining populations are designated as environmental populations (Koza at column 23, lines 35-52). The *Assign Values* step 1312 of Koza noted above occurs *after* the *Evolving Population* steps 1302-1305.

Yet, Koza fails to disclose, teach, or suggest screened candidate networks being stored in a candidate triplet pool.

In this regard, the Office Action fails to show the presence within Koza of a *topology pool*, a *triplet pool*, and a *candidate triplet pool*.

Thus, the claim 18 step of *storing said selected network structures represented by triplets resulting from steps above in a triplet pool* is absent from within Koza.

Arci - Arci arguably teaches a computer system using genetic optimization techniques.

Specifically, Arci arguably teaches that the genetic optimization agent maintains a pool of genotypes 20, representing a current generation of solutions to the problem in question (Arci at column 3, lines 11-13).

Arci arguably teaches that the genetic optimization agent includes a breeding process 22, which processes the genotypes in the pool 20, to produce a set of new genotypes 23 (Arci at column 3, lines 18-19).

Arci arguably teaches that the genetic optimization agent further includes a selection process 26 which selects the best of the genotypes (both from the genotype pool 20 and the new genotype set 23), and places the selected genotypes in the genotype pool (Arci at column 3, lines 38-41).

In this regard, the Office Action fails to show the presence within Arci of a *topology pool*, a *triplet pool*, and a *candidate triplet pool*.

Conclusion

The claims are considered allowable for the same reasons discussed above, as well as for the additional features they recite. Reversal of the Examiner's decision is respectfully requested.

If any fee is required or any overpayment made, the Commissioner is hereby authorized to charge the fee or credit the overpayment to Deposit Account # 18-0013.

Dated: February 12, 2008

Respectfully submitted,

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CLAIMS APPENDIX

1-17 (Canceled).

18. (Previously presented) A method of operating a data processing system, the method comprising the steps of:

providing an expression profile of a network, said network represented by triplets having a network structure, parameters, and a degree of fitness;

generating network structures allowing said expression profile, said generated network structures being stored in a topology pool;

selecting network structures from said topology pool, adapting said parameters to said selected network structures, and computing said degrees of fitness;

storing said networks represented by triplets resulting from steps above in a triplet pool; and

screening candidate networks from said triplet pool, said screened candidate networks being stored in a candidate triplet pool.

19. (Previously presented) The method mentioned in claim 18, wherein the steps of selecting network structures and adapting said parameters comprise the steps of:

selecting N network structures from said topology pool; and

adapting M parameter sets to each of said selected N network structures, said M parameter sets having the highest degree of fitness with said expression profile.

20. (Previously presented) The method mentioned in claim 19, wherein the step of adapting M parameters further comprises the step of:

estimating parameters using a process from the group consisting of a genetic algorithm and simulated annealing.

21. (Previously presented) The method mentioned in a claim 19, wherein after the step of storing networks, the method further comprises the steps of:

reorganizing network structures of N networks in the triplet pool using a process from the group consisting of a genetic algorithm and simulated annealing;

adapting parameter sets to each of said N reorganized network structures; and

storing $N \times M$ networks in said triplet pool, each of said $N \times M$ networks having one of said M parameter sets having high degrees of fitness.

22. (Previously presented) The method mentioned in claim 21, wherein after the step of storing $N \times M$ networks, the method further comprises the steps of:

selecting P triplets having degrees of fitness at or above a predetermined threshold value from among triplets in said triplet pool, left only said P triplets in the triplet pool as a result.

23. (Previously presented) The method mentioned in claim 22, wherein after the step of selecting a P triplet, the method further comprises the steps of:

searching the vicinity of said selected P triplet; and

replacing said searched P triplets when finding a triplet of higher degree of fitness.

24. (Previously presented) The method mentioned in claim 18, wherein the step of screening candidate network comprises the steps of:

producing a mutant triplet for each triplet from said triplet pool, a mutant pool storing said mutant triplet;

evaluating a degree of fitness with a mutant profile for said mutant pool; and

integrating said degrees of fitness for said mutant pool, if a candidate group having a degree of fitness above a certain value being chosen and stored in said candidate triplet pool.

25. (Previously presented) The method mentioned in claim 24, wherein said mutant triplet is produced by eliminating a gene and removing all bonds from said gene.

26. (Previously presented) The method mentioned in claim 18, wherein the structure of said generated network structure is partially known.

27. (Previously presented) A computer program embodied on a computer readable medium comprising:

code means adapted to perform all the steps of claim 18 when said program is run on a data-processing system.

28. (Previously presented) A network estimation apparatus comprising:

means for providing an expression profile of a network, said network represented by triplets having a network structure, parameters, and a degree of fitness;

means for generating network structures allowing said expression profile, said generated network structures being stored in a topology pool;

means for selecting network structures from said topology pool, adapting said parameters to said selected network structures, and computing said degrees of fitness;

means for storing said networks represented by triplets resulting from means above in a triplet pool; and

means for screening candidate networks from said triplet pool, said screened candidate networks being stored in a candidate triplet pool.

29. (Previously presented) A method of operating a data processing system which estimates candidate networks that are descriptive of relationships between interrelated elements as a network and that, when data generated by said elements from said network is given, are capable of reproducing data based on said data given:

said network being represented by a triplet comprising:

a network structure,

a parameter set, and

a degree of fitness between said data given and data reproduced from the network structure and the parameter set,

said method comprising the steps of:

generating a plurality of candidate networks by producing network structures based on partially known network structures, which may allow for reproduction of said data given,

producing corresponding parameter sets and degrees of fitness,

optimizing said networks utilizing the degrees of fitness, and

storing the optimized candidate networks in a first memory means; and

narrowing down appropriate candidate networks from said networks stored in the first memory means, using data different front said given data and that can be generated from network structures which are mutants or crossovers, and storing the networks in a second memory means.

30. (Previously presented) The method mentioned in claim 29, wherein the optimization using the degree of fitness in said step of generating said plurality of candidate networks comprises steps of:

selecting N network structures from the produced network structures,

producing N network structures from said selected N network structures,

adapting M parameter sets to each of the 2N networks utilizing degree of fitness to generate the networks, and

selecting P networks of high degree of fitness from the generated 2N × M networks.

31. (Previously presented) The method mentioned in claim 30, wherein the optimization using the degree of fitness in said step of generating said plurality of candidate networks further comprises steps of:

searching the vicinity of said selected P networks, and

replacing the network when finding a network of higher degree of fitness.

32. (Previously presented) The method mentioned in claim 30, wherein the optimization using the degree of fitness in said step of generating said plurality of candidate networks comprises a step of estimating parameters using a genetic algorithm, simulated annealing, and/or an optimization technique such as the hill-climbing method.

33. (Previously presented) The method mentioned in claim 29, wherein the optimization using the degree of fitness in said step of generating said plurality of candidate networks comprises a step of estimating parameters using a genetic algorithm, simulated annealing, and/or an optimization technique such as the hill-climbing method.

34. (Previously presented) A network estimation apparatus, which estimates candidate networks that are descriptive of relationships between inter related elements as a network and that, when data generated from said network is given, are capable of reproducing said data based on said data given; said network estimation apparatus comprising:

first memory means for storing networks represented by a triplet comprising a network structure, a parameter set, and a degree of fitness between said data given and data reproduced. from the network structure and the parameter set;

second memory means for storing networks as final candidates;

means for generating a plurality of candidate net works by producing a network structure based on partially known network structures, which may allow for reproduction of said data given, producing corresponding parameter sets and degrees of fitness, optimizing said networks utilizing the degrees of fitness, and storing in said first memory means the optimized candidate networks; and

means for narrowing down and storing in said second memory means an appropriate candidate network from net works stored in said first memory means using data different from said given data and that can be generated from network structures which are mutants or crossovers.

35. (Previously presented) A computer program embodied on a computer readable medium, the computer program being adapted to perform steps of:

generating a plurality of candidate networks by producing network structures based on partially known network structures, which may allow for reproduction of said data given,

producing corresponding parameter sets and degrees of fitness,

optimizing said networks utilizing the degrees of fitness, and

storing the optimized candidate networks in a first memory means; and

narrowing down appropriate candidate networks from said networks stored in the first memory means, using data different front said given data and that can be generated from network structures which are mutants or crossovers, and storing the networks in a second memory means.

36. (Previously presented) The computer program mentioned in claim 35, wherein the optimization using the degree of fitness in said step of generating said plurality of candidate networks comprises steps of:

selecting N network structures from the produced network structures,

producing N network structures from said selected N network structures,

adapting M parameter sets to each of the 2N networks utilizing degree of fitness to generate the networks, and

selecting P networks of high degree of fitness from the generated 2N × M networks.

37. (Previously presented) The computer program mentioned in claim 36, wherein the optimization using the degree of fitness in said step of generating said plurality of candidate networks further comprises steps of:

searching the vicinity of said selected P networks, and

replacing the network when finding a network of higher degree of fitness.

38. (Previously presented) The computer program mentioned in claim 36, wherein the optimization using the degree of fitness in said step of generating said plurality of candidate networks comprises a step of estimating parameters using a genetic algorithm, simulated annealing, and/or an optimization technique such as the hill-climbing method.

39. (Previously presented) The computer program mentioned in claim 35, wherein the optimization using the degree of fitness in said step of generating said plurality of candidate networks comprises a step of estimating parameters using a genetic algorithm, simulated annealing, and/or an optimization technique such as the hill-climbing method.

EVIDENCE APPENDIX

There is no other evidence which will directly affect or have a bearing on the Board's decision in this appeal.

RELATED PROCEEDINGS APPENDIX

There are no other appeals or interferences which will directly affect or be directly affected by or have a bearing on the Board's decision in this appeal.